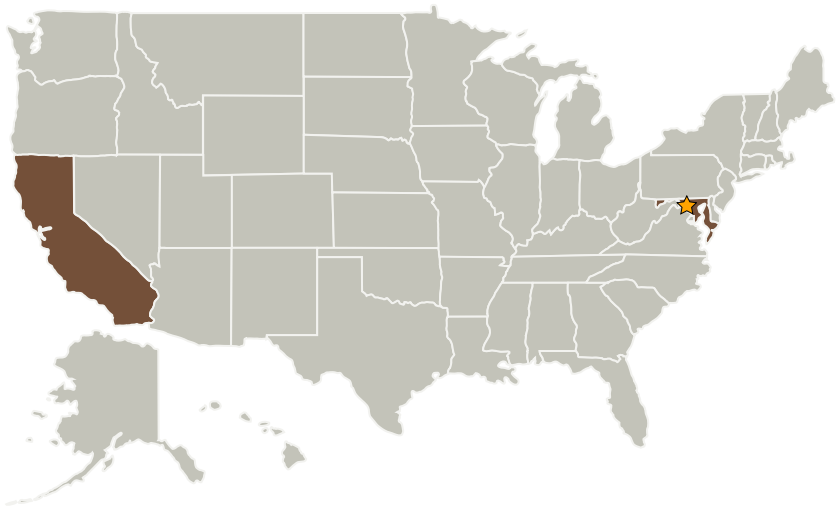
X-Ray Pulsar Based Navigation and Time Determination, Phase I

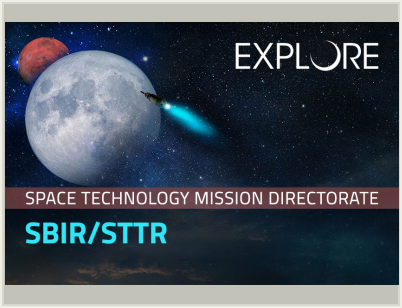
Completed Technology Project (2006 - 2006)

Project Introduction

DARPA recently initiated the XNAV program to undertake development of GPS independent, precision navigation and time determination based on observations of certain extremely stable millisecond X-ray pulsars for near Earth military applications. The groundwork for this effort comes from more than a decade of high-energy astrophysics research at NRL and data from space-based surveys of galactic X-ray sources (e.g., ARGOS/USA, Chandra). These signals can be exploited as a "natural GPS" to provide position information and an extremely stable time reference. Anticipated NASA Applications: 1. Accurate clock synchronization (solar system wide) 2. Fully autonomous, precision navigation (solar system wide) 3. DSN Augmentation 4. Planetary GPS enabler 5. LEO GPS backup Microcosm has worked with NRL on exploitation of this technology for 2.5 years, and we anticipate continued access to their work during Phase I which will examine the utility, and feasibility of developing X-ray pulsar based navigation and time determination technology for candidate NASA applications. Requirements will be determined, approaches developed, and performance potential projected. The Phase II study will develop the most promising applications. Detailed designs will be created, performance simulations developed, utility assessed, a technology roadmap developed, and a mission planning guide developed.

Primary U.S. Work Locations and Key Partners





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Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Small Business Innovation Research/Small Business Tech Transfer

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Organizations Performing Work	Role	Type	Location
★Goddard Space Flight Center(GSFC)	Lead Organization	NASA Center	Greenbelt, Maryland
Microcosm, Inc.	Supporting Organization	Industry Women-Owned Small Business (WOSB)	Hawthorne, California

Primary U.S. Work Locations	
California	Maryland

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Technology Areas

Primary:

- TX05 Communications, Navigation, and Orbital Debris Tracking and Characterization Systems
  - TX05.4 Network Provided Position, Navigation, and Timing
    - TX05.4.2 Revolutionary Position, Navigation, and Timing Technologies